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"Paint Manufacture"

The invention relates to paint manufacture and in particular to a method for manufacturing acrylic emulsion paint.

5 There are several problems in manufacturing emulsion paints, particularly acrylic emulsion paints. As the manufacturing process is essentially a batch process it is time consuming. There is also wastage and adverse paint quality problems in switching from one batch to the next.

10 According to the invention, there is provided a method for manufacturing acrylic emulsion paint comprising the steps of :

delivering an acrylic emulsion resin from a storage tank into a first of at least two mixing tanks;

stirring the resin in the first mixing tank;

15 dispersing pigments in a water base in a dispersion tank to form a pigment dispersion;

20 delivering the pigment dispersion into the resin in the first mixing tank through an inlet at the bottom of the mixing tank while stirring the resin in the mixing tank;

forming an additive dispersion in the dispersion tank;

delivering the additive dispersion into the mixture through the inlet in the first mixing tank;

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homogenising the mixture in the mixing tank to form an acrylic emulsion paint having desired chemical and rheological properties;

opening a bottom outlet from the first mixing tank;

5 delivering the prepared paint from the first mixing tank to an in-line strainer;

pumping the paint through the strainer to a closed inlet valve to a filler tank;

10 opening a main circulating valve on a circulating line to each mixing tank, the circulating line having a circulating inlet valve to each mixing tank;

opening the circulating inlet valve to the first mixing tank;

15 circulating paint from the first mixing tank through the in-line strainer and through the main circulating inlet valve of the first mixing tank;

20 after a circulating period of at least 15 minutes, opening the filler inlet valve, closing the circulating valves and pumping the paint from the first mixing tank to the filler tank;

filling paint from the filler tank into paint containers;

applying lids to the containers; and

labelling the containers.

In a preferred embodiment of the invention the paint is circulated for a period of at least 30 minutes prior to delivery to the filling tank.

5 In one embodiment of the invention the method includes the steps of :-

- preparing paint in a second mixing tank;
- delivering the prepared paint from the second mixing tank to an in-line strainer;
- 10 opening a bottom outlet from the second mixing tank;
- opening the main circulating valve on the recirculating line;
- opening the circulating inlet valve to the second mixing tank;
- 15 circulating paint from the second mixing tank through the in-line strainer and through the main circulating inlet valve of the second mixing tank; and
- 20 after the circulating period, opening the filler inlet valve, closing the circulating valves and pumping the paint from the second mixing tank to the filler tank.

Preferably, the method includes the step of during delivery of paint to the filler tank, automatically
25 closing the filler inlet valve if the amount of paint in the filler tank exceeds a preset amount.

Advantageously, the amount of paint in the filler tank is monitored by monitoring the level of paint in the filler tank.

The invention also provides an apparatus for carrying out
5 the method of the invention, the apparatus comprising :-

a resin storage tank;

a dispersion tank;

a filling tank;

10 at least two mixing tanks each having an inlet and
an outlet at the bottom thereof;

a resin pump for delivery of resin from the resin
storage tank to the mixing tank;

a dispersion pump for delivery of dispersions from
the dispersion tank to the mixing tank;

15 outlet valve means at the outlet of each mixing
tank;

strainer means for straining the paint;

paint pump means for delivery of the paint to the
filling tank;

20 a filler tank inlet valve,

a circulating line extending between the filler
tank inlet valve and each mixing tank;

the circulating line having a main circulating valve and a circulating inlet valve to each mixing tank;

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control means for switching from a circulating mode in which paint in a mixing tank is circulated through the circulating line for a period of at least 15 minutes to a filling mode in which the circulating valves are closed and the filler tank inlet valve is opened to deliver paint from the

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mixing tank to the filler tank;

paint filling means for filling paint from the filler tank into paint containers;

lidding means for applying lids to the containers; and

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labelling means for labelling the containers.

In a particularly preferred embodiment of this aspect of the invention the apparatus includes means for monitoring the amount of paint in the filler tank and for closing the filler tank inlet valve if a preset amount is exceeded.

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Preferably the means for monitoring the amount of paint in the filler tank and for closing the filler tank inlet valve comprises a float switch.

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The invention will be more clearly understood from the following description thereof given by way of example only with reference to the accompanying drawings in which :-

Fig. 1 is a diagrammatic view illustrating the method and apparatus for manufacturing acrylic emulsion paint according to the invention;

Fig. 2 is a plan view of part of the apparatus for manufacturing acrylic paint;

Fig. 3 is a perspective view of one part of the apparatus of Fig. 2; and

5 Fig. 4 is a perspective view of another part of the apparatus of Fig. 2.

Referring to the drawings in the method for manufacturing acrylic emulsion paint according to the invention, acrylic emulsion resin is delivered from one of two storage tanks
10 2 into one of two mixing tanks 3,4. The first mixing tank will be designated 3 for convenience. The resin is stirred in the mixing tank 3 using a mixer. Pigments, thickeners, dispersants, extenders, and pH adjusters are dispersed in a water-base in a dispersion tank 5 and the
15 pigment dispersion is delivered into the resin in the mixing tank 3. The resin is mixed with the dispersion in the mixing tank 3 and during this period an additive dispersion including for example coalescent, preservative and thickener material is prepared in the dispersion tank
20 5 and delivered, after mixing of the resin and pigment dispersion, into the first mixing tank 3.

The mixture in the mixing tank 3 is homogenised to form an acrylic emulsion paint having desired chemical and rheological properties. Typically, the specific gravity
25 is between 1.2 and 1.3 and the pH is in the range 8:10 and the viscosity is in the range 80-110 Ku. The paint mixing is carried out in a first mixing tank 3 and is delivered, after circulating as described below, through an in-line strainer 10 by a pump 12 to a filler tank 15.

30 The apparatus includes resin pumps 20,21 for delivering the resin from the storage tanks 2 to one or other of the

mixing tanks 3,4 through flexible couplings 22,23 respectively. The dispersions from the dispersion tank 5 are pumped by a pump 24 through flexible connections 25,26 to one or other of the mixing tanks 3,4. The mixing tanks 3,4 have inlet connection points 30,31 respectively (see Fig. 3) to which the flexible pipes are connected. By delivering the resin and dispersions through the bottom inlets 30, 31 the maximum mixing efficiency and minimum foaming is achieved.

Outlet valves 35,36 respectively are provided at bottom outlets of the mixing tanks 3,4 and inlet strainer valves 37,38 direct the flow of paint from the appropriate mixing tank 3,4 to the strainer 10.

Referring particularly to Fig. 2, paint is delivered by the pump 12 to a filler tank inlet valve 40. A circulating line 47 has a main circulating valve 41 and a circulating inlet valve 42,43 respectively for each mixing tank 3,4.

The amount of paint in the filler tank 15 is controlled by monitoring the amount of paint in the tank and, when a preset amount is reached, the filler tank inlet valve 40 is automatically closed. In this case the amount of paint in the filler tank 15 is controlled by a float switch 50 which automatically closes the filler tank inlet valve 40 if the level of paint in the filler tank 50 exceeds a preset level.

In operation, paint is prepared as described above in the first mixing tank 3. After the paint is prepared, the outlet valve 35 from the first mixing tank 3 and inlet strainer valve 37, the main circulating valve 41, and the inlet circulating valve 42 to the first mixing tank 3 are opened while the outlet valve 36 from the second mixing

tank 4 and inlet strainer valve 38, the filler tank inlet valve 40 and the inlet circulating valve 43 to the second mixing tank are closed. Paint from the first mixing tank 3 is then circulated by the pump 12 through the strainer 10 and a leg 47a of the circulating line 47 back to the mixing tank 3 through the inlet circulating valve 42. The paint is circulated in this way to purge all the lines and equipment associated with the first mixing tank to ensure maximum quality and usage of paint. The circulation is carried out for a period of at least 15 minutes and preferably for at least 30 minutes while the mixer in the mixing tank 3 is operated to achieve a homogenously mixed acrylic emulsion paint. After circulation, a single switch is operated to convert the system to a filling mode by first closing the outlet valve 37, and after pumping any paint in the line 47 back to the first mixing tank 3, closing the main circulating valve 41, the inlet circulating valve 42 and opening the outlet valve 37 and the filler tank inlet valve 40. This allows the paint from the first mixing tank 3 to be delivered to the filler tank 15 by the pump 12 through the strainer 10. While the circulation of the paint from the first tank 3 is continuing another batch of paint may be made up in the second mixing tank 4 as described above. When all the paint from the first mixing tank 3 has been delivered to the filler tank 15 the paint in the second mixing tank 4 may be circulated in a similar manner to that described above for the first mixing tank 3. In this mode the tank outlet valve 38, main circulating valve 41 and the circulating inlet valve 43 are open while the valves 37, 40 and 42 are closed. After circulation as described above a switch is operated to close valves 41 and 43 while opening valve 40 allowing paint from the second mixing tank 4 to be delivered to the filler tank 15.

Paint is filled from the filling tank 15 into containers 60 to which lids 61 are fitted and labels are applied.

5 The invention provides an optimised method for manufacturing acrylic emulsion. The system saves processing time by reducing downtime between batches. The quality of the paint is optimised while utilising all the paint made in every batch. The method is also simple to operate and the equipment can be operated from ground level.

10 Variations on the embodiment of the invention described will be readily apparent and accordingly the invention is not limited to the embodiment hereinbefore described which may be varied in both construction and detail.

CLAIMS

1. A method for manufacturing acrylic emulsion paint comprising the steps of :

- 5 delivering an acrylic emulsion resin from a storage tank into a first of at least two mixing tanks;
- stirring the resin in the first mixing tank;
- dispersing pigments in a water base in a dispersion tank to form a pigment dispersion;
- 10 delivering the pigment dispersion into the resin in the first mixing tank through an inlet at the bottom of the mixing tank while stirring the resin in the mixing tank;
- forming an additive dispersion in the dispersion tank;
- 15 delivering the additive dispersion into the mixture through the inlet in the first mixing tank;
- homogenising the mixture in the mixing tank to form an acrylic emulsion paint having desired chemical and rheological properties;
- 20 opening a bottom outlet from the first mixing tank;
- delivering the prepared paint from the first mixing tank to an in-line strainer;
- 25

pumping the paint through the strainer to a closed inlet valve to a filler tank;

5 opening a main circulating valve on a circulating line to each mixing tank, the circulating line having a circulating inlet valve to each mixing tank;

opening the circulating inlet valve to the first mixing tank;

10 circulating paint from the first mixing tank through the in-line strainer and through the main circulating inlet valve of the first mixing tank;

15 after a circulating period of at least 15 minutes, opening the filler inlet valve, closing the circulating valves and pumping the paint from the first mixing tank to the filler tank;

filling paint from the filler tank into paint containers;

applying lids to the containers; and

labelling the containers.

20 2. A method as claimed in claim 1 wherein the paint is circulated for a period of at least 30 minutes prior to delivery to the filling tank.

3. A method as claimed in claim 1 or 2 including the steps of :-

25 preparing paint in a second mixing tank;

delivering the prepared paint from the second mixing tank to an in-line strainer;

opening a bottom outlet from the second mixing tank;

5 opening the main circulating valve on the recirculating line;

opening the circulating inlet valve to the second mixing tank;

10 circulating paint from the second mixing tank through the in-line strainer and through the main circulating inlet valve of the second mixing tank; and

15 after the circulating period, opening the filler inlet valve, closing the circulating valves and pumping the paint from the second mixing tank to the filler tank.

20 4. A method as claimed in any preceding claim including the step of during delivery of paint to the filler tank, automatically closing the filler inlet valve if the amount of paint in the filler tank exceeds a preset amount.

5. A method as claimed in claim 4 wherein the amount of paint in the filler tank is monitored by monitoring the level of paint in the filler tank.

25 6. A method as claimed in any preceding claim wherein resin is delivered from the resin storage tank into the mixing tank by pumping the resin to the inlet at the bottom of the mixing tank.

7. A method for manufacturing acrylic emulsion paint substantially as hereinbefore described with reference to the accompanying drawings.
- 5 8. Apparatus for carrying out the method of any preceding claim comprising : -
- a resin storage tank;
- a dispersion tank;
- a filling tank;
- 10 at least two mixing tanks each having an inlet and an outlet at the bottom thereof;
- a resin pump for delivery of resin from the resin storage tank to the mixing tank;
- a dispersion pump for delivery of dispersions from the dispersion tank to the mixing tank;
- 15 outlet valve means at the outlet of each mixing tank;
- strainer means for straining the paint;
- paint pump means for delivery of the paint to the filling tank;
- 20 a filler tank inlet valve,
- a circulating line extending between the filler tank inlet valve and each mixing tank;

the circulating line having a main circulating valve and a circulating inlet valve to each mixing tank;

5 control means for switching from a circulating mode in which paint in a mixing tank is circulated through the circulating line for a period of at least 15 minutes to a filling mode in which the circulating valves are closed and the filler tank inlet valve is opened to deliver paint from the
10 mixing tank to the filler tank;

paint filling means for filling paint from the filler tank into paint containers;

lidding means for applying lids to the containers; and

15 labelling means for labelling the containers.

9. Apparatus as claimed in claim 8 including means for monitoring the amount of paint in the filler tank and for closing the filler tank inlet valve if a preset amount is exceeded.

20 10. Apparatus as claimed in claim 9 wherein the means for monitoring the amount of paint in the filler tank and for closing the filler tank inlet valve comprises a float switch.

25 11. Apparatus for manufacturing acrylic emulsion paint as claimed in claim 8, 9 or 10 and substantially as hereinbefore described with reference to the accompanying drawings.

12. Acrylic emulsion paint whenever manufactured by a method as claimed in any of claims 1 to 7 or using an apparatus as claimed in any of claims 8 to 11.

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1/4 (FORMAL)

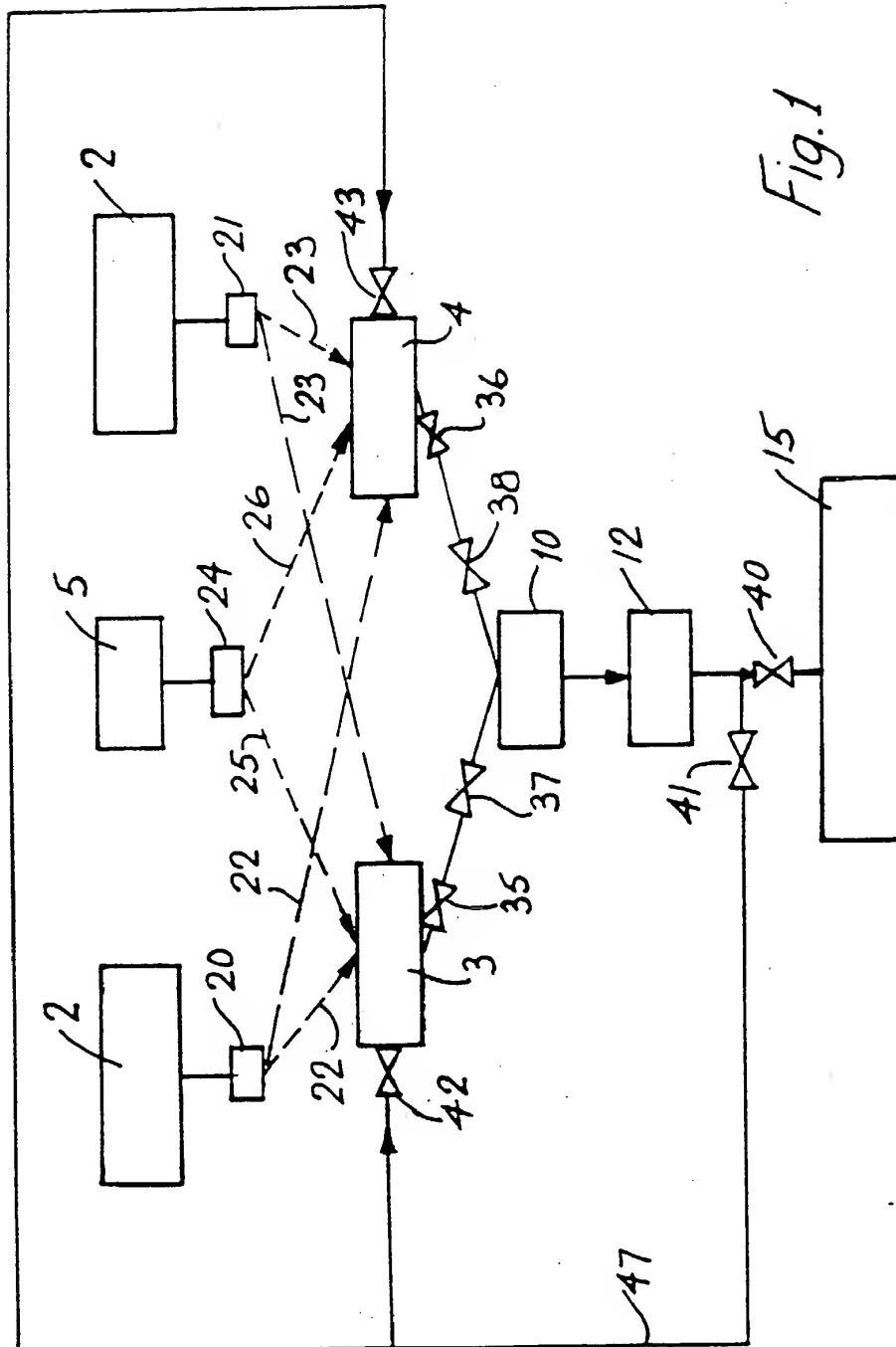


Fig. 1

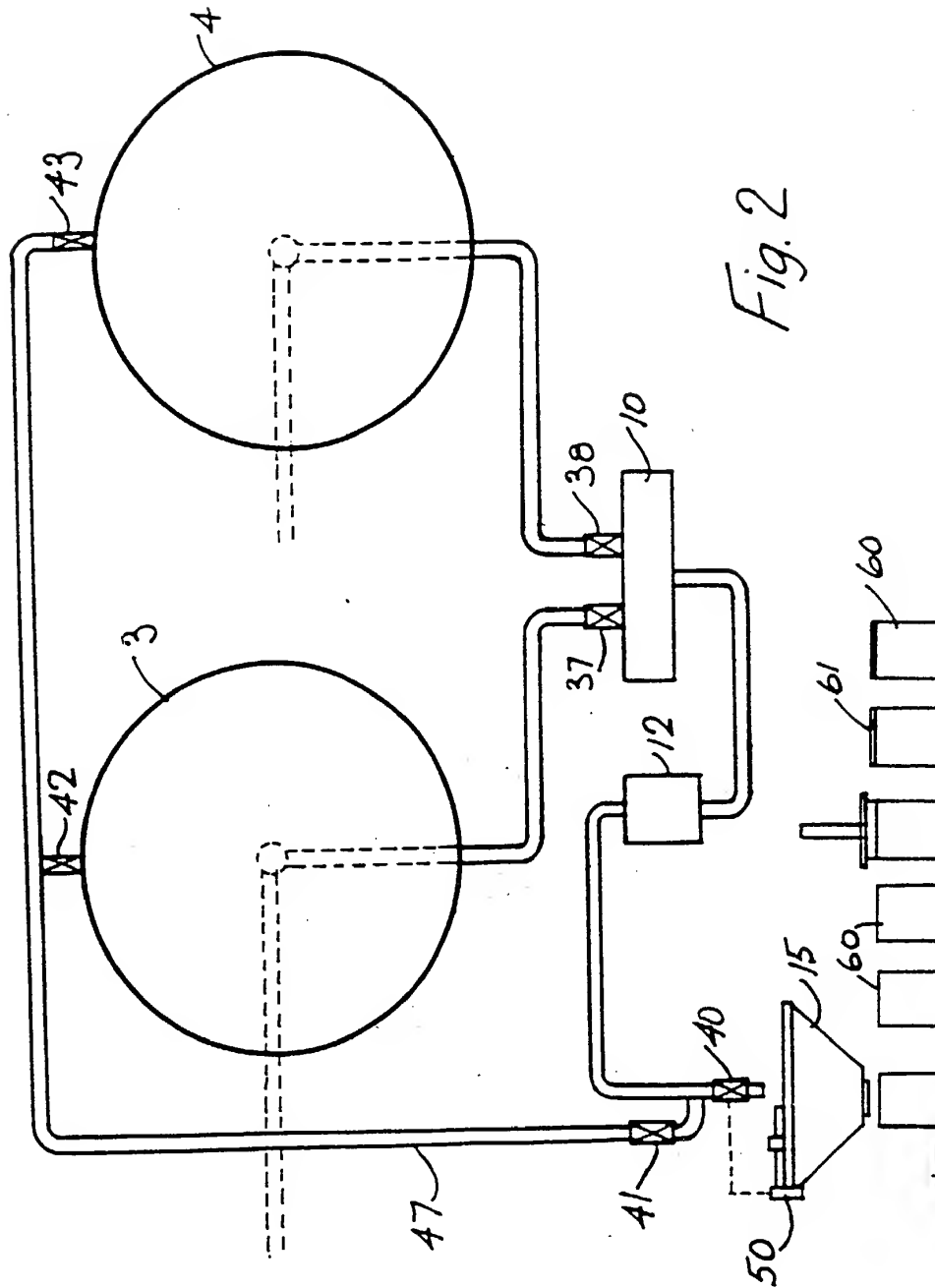


Fig. 2

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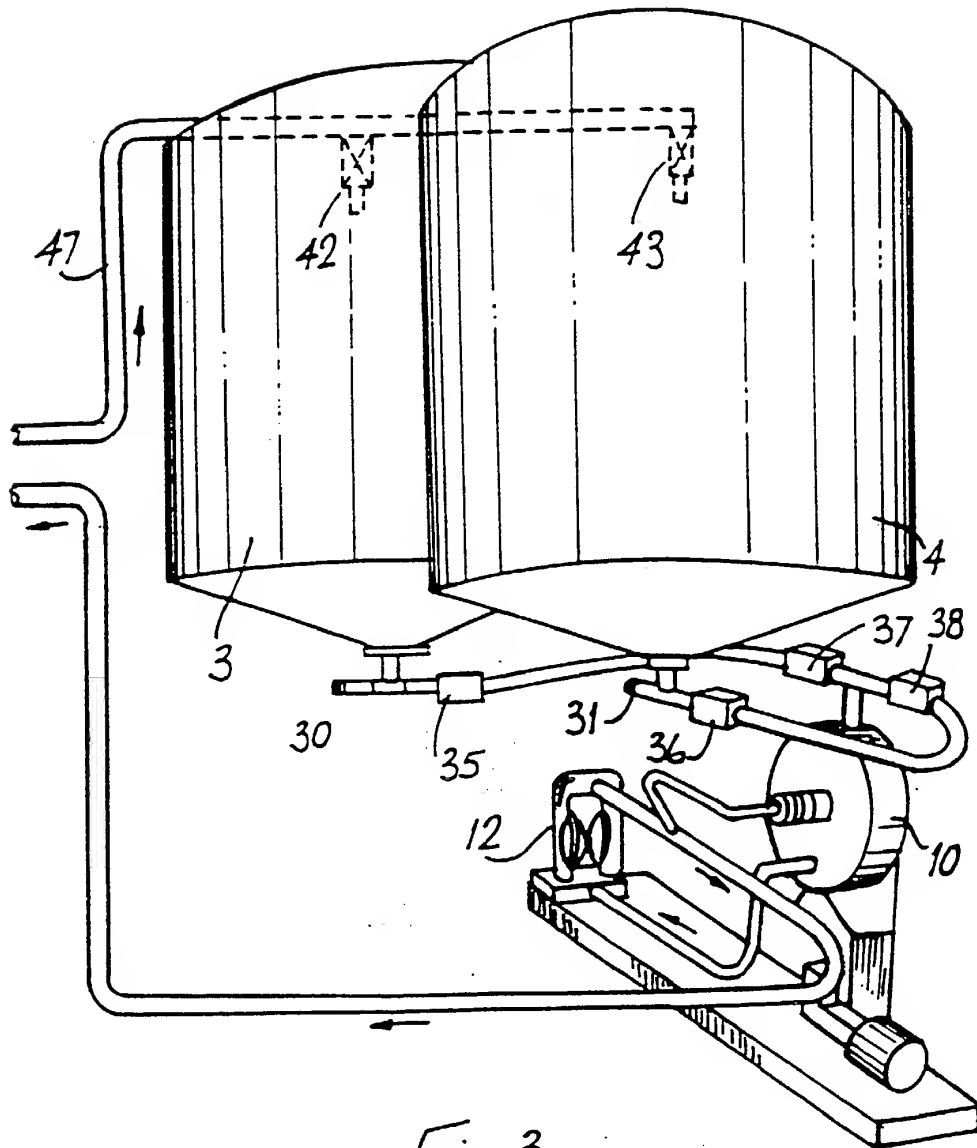


Fig. 3

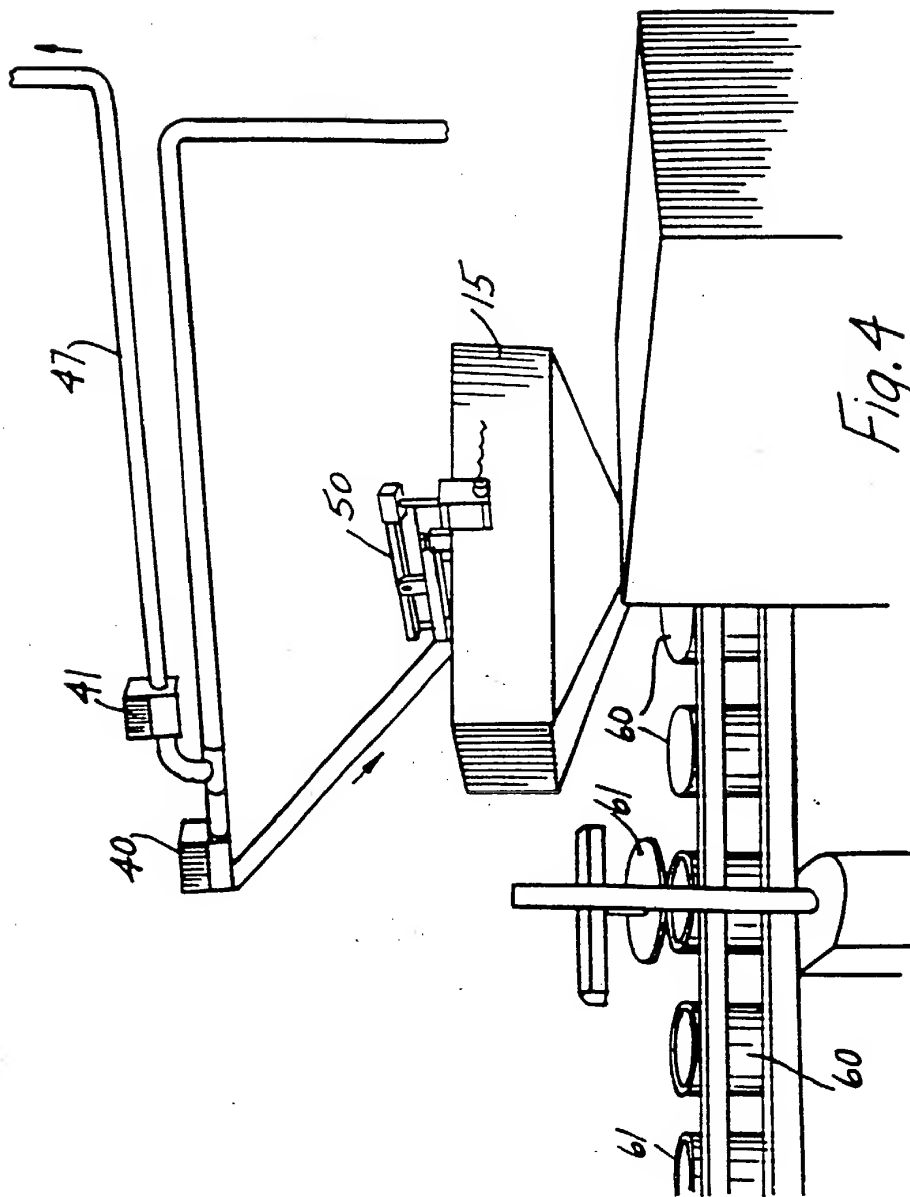


Fig. 4